SOME DATA ABOUT THE MIGRATION OF THE DIURNAL BIRDS OF PREY OVER THE MATEIAȘ AREA (SOUTHERN CARPATHIANS, ARGEȘ COUNTY, ROMANIA)

MESTECĂNEANU Adrian, MESTECĂNEANU Florin

Abstract. The main aim of this paper was to reveal the amplitude of the migration of diurnal birds of prey through a pass of the Southern Carpathians, known as the Rucăr-Bran Corridor, although, as we saw, at least a small part of the individuals used a lateral branch of it, on the North-South direction, the Tămaș Corridor. A low passage was discovered at the points of observations centered on the Mateiaș Mountain, situated toward the southern opening of the corridor, 16 species, represented by 645 individuals, being recorded between 2008 and 2020. A few individuals, that were not considered migratory, of other species can be added. However, the study represents only a sample, because of the limited days of survey, and we expect that the real number of individuals that seasonally migrate over the location to be much higher. Differences were seen between the spring migration and the autumn one. *Buteo buteo* (Linnaeus, 1758) was the dominant species in spring and *Circus aeruginosus* (Linnaeus, 1758) in autumn. Most of the individuals were observed during the week April 2-8, respectively September 24-30 and, as hourly intervals, between 10:00 and 10:59, in spring, respectively between 13:00 and 13:59, in autumn. Their direction of flight was generally on the North-South axis, with deviations depending on the season and species.

Keywords: birds of prey, migration, Mateiaș.

Rezumat. Câteva date despre migrația păsărilor răpitoare diurne peste zona Mateiaș (Carpații Meridionali, județul Argeș, România). Principalul obiectiv al acestei lucrări a fost de a releva amplitudinea migrației păsărilor de pradă diurne printr-o trecătoare a Carpaților Meridionali, cunoscută sub numele de Culoarul Rucăr-Bran, deși, după cum am constatat, cel puțin o mică parte dintre exemplare au folosit o ramură laterală a sa, orientată Nord-Sud, și anume Culoarul Tămașului. A fost descoperit un pasaj redus în punctele de observație concentrate în jurul Muntelui Mateiaș, situat către deschiderea sudică a coridorului, 16 specii, reprezentate prin 645 de exemplare, fiind înregistrate între 2008 și 2020. La acestea se pot adăuga câteva exemplare ale unor specii care n-au fost considerate migratoare. Totuși, studiul de față reprezintă doar un sondaj, din cauza numărului redus de zile de monitorizare, și ne așteptăm ca numărul real de exemplare care migrează sezonier prin zonă să fie mult mai mare. Au fost consemnate diferențe între migrația de primăvară și cea de toamnă. *Buteo buteo* (Linnaeus, 1758) a fost specia dominantă primăvara, iar *Circus aeruginosus* (Linnaeus, 1758), toamna. Majoritatea exemplarelor au fost observate în săptămâna 2-8 aprilie, respectiv 24-30 septembrie, iar, ca intervale orare, între 10:00 și 10:59, primăvara, respectiv între 13:00 și 13:59, toamna. Direcția lor de zbor a fost, în general pe axa nord-sud, cu abateri în funcție de sezon și specie.

Cuvinte cheie: păsări de pradă, migrație, Mateiaș.

INTRODUCTION

The migration of the birds of prey in Romania has not been studied fully so far. Though since the end of the 19th century and the beginning of the 20th century some authors mention migratory species of raptors in their area of interest (BIELZ, 1888; CZYNK, 1895; SCHENK, 1917; SPIESS, 1941), the oldest and most comprehensive information particularly refer to the arrivals and departures dates, especially in the southern half of the territory, from Banat to Dobruja (LINȚIA, 1954). The few works that cover the whole territory of the country are more recent and deal with the ways of migration of all species of birds from Romania (RUDESCU, 1958; MUNTEANU, 1969; CĂTUNEANU et al., 1978; MĂTIEȘ, 1986; MUNTEANU & MĂTIEȘ, 2011) or the occurrence of these predators throughout the year (TĂLPEANU, 1966, 1967) and many studies converged to the fact that the birds migrate in large fronts and not necessarily in narrow formations, using landmarks for a facile orientation (ONEA, 2002). Although it is considered that in Romania there are five locations primarily used by raptors: Dobruja, the inferior and upper course of the Mureș River, Prut Valley, Tur Valley (https://monitoring.sor.ro/), dedicated studies, principally about the autumn migration, came from the Eastern part of country: Dobruja (DOMAHIDI & KOMÁROMI, 2004; DOMAHINDI et al., 2004; MILVUS GROUP, 2008, 2011; POCORA, 2010; PÂRÂU, 2011; FÜLÖP et al., 2012, 2018), the Black Sea (STANCIU et al., 2017a), the Iași County (BALTAG, 2010), etc. Some data about migration originate from the reports on biodiversity connected to the wind farms from the Eastern part of Romania (http://apmtl-old.anpm.ro/, http://www.anpm.ro/ etc.), too. Even if we do not intend to do here a history of the researches in Romania, it must be said that some interesting data on the subject can be also extracted from generalist works or from papers focused on other ornithological themes (VASILIU & RODEWALD, 1940; FILIPAȘCU, 1966; ANTAL, 1968; VASILIU & ȘOVA, 1968; PAPADOPOL & RANG, 1972; CĂTUNEANU, 1973; KALABÉR, 1979; RADU, 1979; KLEMM & KOHL, 1988; CIOCHIA, 1992; KISS, 1997; KÓNYA, 1997; ARDELEAN & TRIFONOF, 2000; MUNTEANU, 2000; POPESCU, 2000; GACHE, 2002; MITRULY, 2002; MUNTEANU, 2005; PETRESCU, 2005; ION et al., 2009; DOROȘENCU, 2011; RIDICHE, 2012 etc.). On the other hand, only a few articles followed the particularities of migration of certain species of birds of prey, like *Aquila pomarina* Brehm, 1831 (GOMBOS, 1969), *Milvus migrans* (Boddaert, 1783) (PAȘCOVSCHI, 1969) or *Buteo buteo* (STANCIU et al., 2017b).

From the Argeș County, data about the migration of the diurnal migratory birds of prey were mainly published after 1950 (MĂTIEȘ, 1969, 1974), and mostly after 2000 (MESTECĂNEANU, 2005, 2007a, 2008, 2011; MESTECĂNEANU & MESTECĂNEANU, 2006, 2007, 2008, 2010b, 2011c, 2012), the latter especially from the Râul

Doamnei hydrographical basin. However, except for a series of works regarding the passage of *Ciconia ciconia* (Linnaeus, 1758) (MESTECĂNEANU & MESTECĂNEANU, 2010a, 2011a, b), various data, collected after 2005, about the migration of birds through the county, including raptors, are yet unpublished.

A few works refer to the migration over the Carpathians (PAȘCOVSCHI, 1938; RUDESCU, 1958; RADU, 1967; MUNTEANU, 1969; MĂTIEȘ, 1986; MUNTEANU, 2011), and particularly over the Transylvanian Alps (MĂTIEȘ, 1969, 1971; MESTECĂNEANU et al., 2018a, b; MESTECĂNEANU, 2020 etc.) and although, generally, it is considered that the birds prefer to cross the mountains through passes, following ways of migration, some individuals were also observed flying over the ridges, in our case over the Leaota, Iezer-Păpușa and Făgăraș Mountains (MĂTIEȘ, 1986; MESTECĂNEANU, 2007b; MESTECĂNEANU et al., 2018a; personal and unpublished data). Usually, the mountains from the area are avoided, the birds using the Olt Valley and the Rucăr-Bran Corridor (RUDESCU, 1958; OLARU, 1972; MĂTIEȘ, 1969, 1977, 1986). Other authors (MUNTEANU, 1969; CĂTUNEANU et al., 1978) show the Olt Defile and the Prahova Way, as crossing places for the birds through Făgăraș-Bucegi Group of Mountains and others consider the Carpathians as a natural obstacle for the birds, influencing the direction of migration (https://milvus.ro/).

Although the Rucăr-Bran Corridor is mentioned sometimes (MĂTIEȘ, 1969, 1971; DOROȘENCU, 2011; PÂRÂU, 2011; MESTECĂNEANU, 2011, 2020; MESTECĂNEANU et al., 2018a, b, etc.), no special papers about its passage of birds were published until now. Consequently, our aim was to bring in the ornithological literature concrete data about the migration of the birds of prey through this area, while considerations about the migration of other species of birds will be exposed in another paper. Also, the influence of the weather, of the local relief and vegetation on the birds of prey migration will be approached with other occasion.

MATERIAL AND METHODS

In this paper we intend to bring data about the migration of birds of prey over the Mateiaș area, a place situated South of Rucăr-Bran Corridor, a form of relief that separates the Piatra Craiului Mountains from the Leaota Mountains, two units that belong to the Bucegi Group of Mountains from the Southern Carpathians (Fig. 1). The Rucăr-Bran Corridor is oriented NE-SW and it is created by the Dâmbovița River (with the Cheia and Giuvala rivulets), in the South-West, toward Rucăr, and by the Turcul River, affluent of Bârsa, in the North-East, toward Bran. Between them there is the Bran (Giuvala) Pass (1,290 m). Converging to Podu Dâmboviței, upstream of Rucăr, there is another corridor that delimitates the Iezer-Păpușa Mountains (belonging to Făgăraș Massif) from the Piatra Craiului Mountains, generally oriented N-S, known as the Tămaș Corridor. In the South, it is created by Tămaș, tributary to Dâmbovița River, and, in the North, by Bârsa Tămașului, a tributary to Bârsa River, affluent of Olt. The Tâmaș Ridge splits the two hydrographical basins, where Curmătura Foii (1,367 m), Cumătura Oțetelei (1,484 m) and Șaua Tămașului (1,510 m) are the lowest gaps (BARCO & NEDELCU, 1974; Google Earth Database).

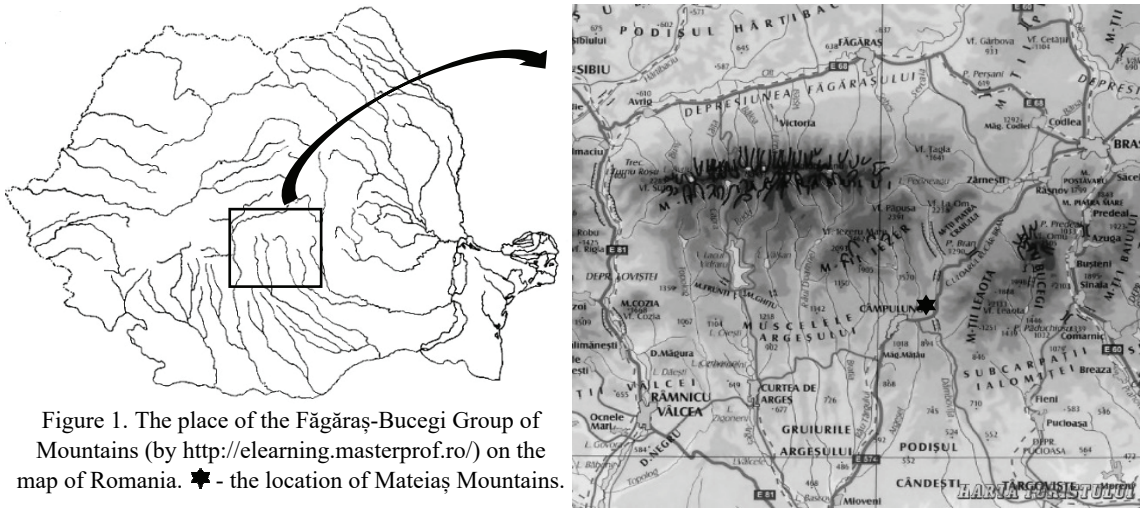


Figure 1. The place of the Făgăraș-Bucegi Group of Mountains (by http://elearning.masterprof.ro/) on the map of Romania. ✸ - the location of Mateiaș Mountains.

Mateiaș is a small mountain of limestone situated on the right bank of the Dâmbovița River, ca. 9 km SSW of Rucăr. It borders toward NNE the Câmpulung Depression and, practically, like a funnel, it marks the place of entrance and exit from the southern low crests of the Iezer-Păpușa Mountains and western low heights of the Leaota Mountains. On the one hand, we are dealing with the Țefeleica-Căpitanul ridge, that continues with Plăișoru (1,140 m), Măgurei (1,217 m) and Mateiaș (1,239 m), all from the Iezer-Păpușa Mountains, and, on the other hand, with the Prislop (1,434 m), Algaiul (1,157 m), Călugărul (1,066 m) hillocks from the Leaota Mountains. Toward South, the relief becomes gradually lower, being crossed by numerous tributaries from the upper and middle hydrographical basins of Argeș (Râul Doamnei, Râul Târgului, Argeșel, Cârcinov, Dâmbovița) and Ialomița Rivers (BARCO & NEDELCU, 1974; Google Earth Database).

The vegetation of the Mateiaș area is composed by the broadleaf forests in the lower ways, with *Fagus sylvatica* L., *Carpinus betulus* L., *Acer pseudoplatanus* L., *Fraxinus excelsior* L. etc. and by the forests of coniferous with *Picea abies* (L.)

H. Karst and *Larix decidua* Mill., on the heights. Between them, there is the level of the mixed forests, with *Picea abies*, *Fagus sylvatica* and *Abies alba* Mill.. *Pinus sylvestris* L. occupies large areas, too, especially on Mateiaș Peak. *Festuca supina* Schreb., *Agrostis rupestris* All., *Poa supina* Schard., *Nardus stricta* L. etc. compose the grasslands between the forests. On the rocky areas grow bushes of *Rosa corymbifera* Borkh., *Crataegus monogyna* Jacq., *Sorbus aucuparia* L., *Juniperus communis* L. etc. (ALEXIU, 2008; DONIȚĂ et al., 2005).

The climate has mountain features. The annual average temperature is 4°C on the crests of the Tamaș Ridge and 7-8°C in the Subcarpathian area, while 14°C is the isotherm of July in Rucăr. Other values for Rucăr: September 8 – the first frost, October 30 – the last frost, 134.8 – the number of days with covered sky, 800-900 mm – the average annual amount of precipitations, 122 mm – the mean of June, the richest month in precipitations, 33 mm – the mean of February, the poorest month in precipitations (BARCO & NEDELCU, 1974). The average of the maximum temperature of the air is the highest in August (21°C) and the lowest in January (-8°C). The wind blows preponderantly to NW and NNW and reaches the highest intensity from November to April (https://www.meteoblue.com/).

In the perimeter, there is a limestone quarry that caused irreversible changes on the natural environment (STANCU, 2013; MANEA et al., 2014).

The study was performed between 2008 and 2020. There were 41 days of monitoring, unequally distributed, between March 12 and May 31, in spring, respectively between August 28 and November 1, in autumn: 7 in March, 13 in April, 4 in May, 1 in August, 13 in September, 2 in October, and 1 in November, that means 24 in the spring migration and 17 in the autumn migration. By the place of survey, the days with observations were distributed as follows: Mateiaș Mountain – 43.98%, Mateiaș Mountain vicinities (Lunca Gârții, Nămăiești, Piatra, Slatina, Stoenești, Valea Mare-Pravăț) – 23.4%, localities situated no more than 17 km South of Mateiaș Mountain, on Argeșel Valley (Boteni, Suslănești, Lunca) – 21.27%, and points located no more than 23 km North of Mateiaș Mountain (Rucăr: Săticul de Sus Village, Andreiașu and Piatra Craiului Mountains) – 6.38%. The diurnal period of monitoring was 9:00 – 19:00, Romanian Standard Time (UTC+2). The birds were individually counted and, in every place of observation, the date, the hour, the air temperature, the nebulosity (from 0 to 10), the major type of clouds (by https://www.metoffice.gov.uk/), the wind intensity by Beaufort Scale, the type of flight (soaring, gliding, active flight), the direction of flight, the height of flight from the ground, and other flight particularities were noted. The sex and the age of individuals were registered, where applicable. As tools, we used binoculars (12x50, 15x50) and a photo device with 42X, the optical zoom. The constancy and the dominance were calculated by the usual method (GOMOIU & SKOLKA, 2001). The individuals were identified with specialized guides (FORSMAN, 2007, 2016).

RESULTS AND DISCUSSIONS

During the period of study, in 35 days with observed individuals (85.37% of all days of observations, 79.17% of all days in the spring migration and 94.11% of all days in the autumn migration), 16 species of birds of prey were observed in passage and 645 individuals were summed after 409 observations of solitary or grouped birds. On April 19, 2009, May 31, 2009, October 31, 2009, April 3, 2011, April 16, 2012, migratory individuals were not registered, despite the good or fairly good conditions for migration and, consequently, factors of meteorological nature from outside the area (for example, intense rain or snowfall, strong wind, dense clouds over mountain passes) obstructed the birds to appear here, the more so as, in certain years, birds in passage has been recorded in some of these days (April 3, 2018 and 2020). Although it was a relatively long period of study, the number of species and individuals were relatively low by comparison with other areas from Romania known for their abundance of migratory birds (PÂRÂU, 2011; FÜLÖP et al., 2012, 2018). 12 species and 249 individuals were recorded in the spring migration (10.38 individuals/day) and 14 species and 396 individuals were recorded in the autumn migration (23.29 individuals/day, more than twice than in spring). *Buteo lagopus* (Pontoppidan, 1763), *B. rufinus* (Cretzschmar, 1829), *Circaetus gallicus* Gmelin, 1788 and *Falco vespertinus* Linnaeus, 1766 were observed only in the autumn passage and *Milvus migrans* and *Pandion haliaetus* (Linnaeus, 1758) only in the spring migration, the rest of 10 species – *Accipiter nisus* (Linnaeus, 1758), *Aquila pomarina*, *Buteo buteo*, *Circus aeruginosus* (Linnaeus, 1758), *C. cyaneus* (Linnaeus, 1766), *C. macrourus* (Gmelin, 1770), *C. pygargus* (Linnaeus, 1758), *Falco subbuteo* Linnaeus, 1758, *F. tinnunculus* Linnaeus, 1758, and *Pernis apivorus* (Linnaeus, 1758) – being common in observations both in the spring and in the autumn migration (Table 1, Table 2).

Regarding the variation in time of the total strengths, in the spring migration, a maximum is obvious during 16-29 March, principally due to *Buteo buteo*, *Accipiter nisus* and *Aquila pomarina* and around April 5, due to another wave of individuals of *B. buteo* and *A. pomarina,* depending on the weather conditions that changed from year to year. The maximum of total individuals (50) was attained on April 5, 2015, while the *A. nisus* reached the maximum (19 individuals) on March 27, 2016, *A. pomarina* reached the maximum (16 individuals) on April 5, 2015, *B. buteo* reached the maximum (42 individuals) on March 16, 2010, *Circus aeruginosus* reached the maximum (9 individuals) on April 6, 2013, *C. cyaneus* also reached the maximum (5 individuals) on April 6, 2013. The other species (*C. macrourus*, *C. pygargus*, *Falco subbuteo*, *F. tinnunculus*, *Milvus migrans*, *Pandion haliaetus*, and *Pernis apivorus*) generally were represented by a few individuals, although *Falco tinnunculus* numbered in total 11 individuals and *Pandion haliaetus*, 7. *Buteo buteo*, *Circus cyaneus* started the migration through the area probably before March 12, the earliest day of observations, and *C. aeruginosus* and maybe other species like *C. macrourus*, *C. pygargus*, *Pandion haliaetus*, *Pernis apivorus*, etc., continued it after May 11, the latest day of observations. The migration was recorded between March 16 and April 12, with the peak at the end of March, for *Accipiter nisus*, March 27

and April 9, with the maximum in the last days of March, the first day of April, for *Aquila pomarina,* March 12 and April 12, with two enhancements after the middle of March and the beginning of April, for *B. buteo*, March 27 and May 11, with most individuals in the first half of April, for *Circus aeruginosus*, March 15 and April 12, for *C. cyaneus*, April 21 and May 4, for *C. pygargus*, March 16 and April 12, for *Falco tinnunculus*, March 27 and April 21, for *Milvus migrans*, April 3 and May 4, for *Pandion haliaetus* (Table 1). Similarly, *B. buteo* had two peaks in Dobruja (STANCIU et al., 2017).

Table 1. The strengths of the species of birds depending on the days of observation and their constancy and dominance in the spring migration.

No.	Species	12.03.2017	15.03.2009	16.03.2010	27.03.2016	29.03.2009	30.03.2019	1.04.2017	3.04.2018	3.04.2020	4.04.2015	5.04.2015	5.04.2018	6.04.2013	9.04.2016	12.04.2015	21.04.2014	3.05.2015	4.05.2017	11.05.2017	Constancy	Index of constancy	Dominance	Index of dominance
1	*Accipiter nisus*			1	19		4		2	1	2	1	1		1	2					41.67	C2	13.65	D5
2	*Aquila pomarina*				2	12		4		1	1	16			2						29.17	C2	15.26	D5
3	*Buteo buteo*	3	1	42	10					1	3	22			2	4					37.50	C2	35.34	D5
4	*Circus aeruginosus*				2	4	1		1	3	4	6		9	4	2		5	1	1	54.17	C3	17.27	D5
5	*Circus cyaneus*		1			2	1				1	1		5		2					29.17	C2	5.22	D4
6	*Circus macrourus*																		1		4.17	C1	0.40	D1
7	*Circus pygargus*																1	4	1		12.50	C1	2.41	D3
8	*Falco subbuteo*																	1			4.17	C1	0.40	D1
9	*Falco tinnunculus*			1		3				1	1	1	1		2	1					33.33	C2	4.42	D3
10	*Milvus migrans*				1							1					1				12.50	C1	1.20	D2
11	*Pandion haliaetus*								1			2		1		1	1		1		25.00	C1	2.81	D3
12	*Pernis apivorus*																	1	3		8.33	C1	1.61	D2
All species		3	2	44	34	21	6	4	4	7	12	50	2	15	11	12	3	11	7	1		- period of migration		

Legend: C1 – occasional species, C2 – accessory species, C3 – constant species, C4 – euconstant species, D1 – subrecedent species, D2 – recedent species, D3 – subdominant species, D4 – dominant species, D5 – eudominant species.

In the autumn migration, the maximum of the total number of individuals was at the end of September (59 individuals on September 28, 2014), with a significant amount of *Buteo buteo*, *Falco vespertinus* and *Circus aeruginosus*, but important strengths were also registered at the middle of October (45 individuals on October 19, 2014), due to *B. buteo* and *Accipiter nisus*, and at the middle of September (42 individuals on September 13, 2005). The most abundant species were *B. buteo*, with a maximum of 30 individuals, recorded on September 28, 2008, *C. aeruginosus*, with a maximum of 24 individuals, recorded on September 13, 2009, *A. nisus*, with maximum 20 individuals, recorded on September 28, 2014, and *Pernis apivorus*, with a maximum of 15 individuals, recorded on September 13, 2015. Other authors (DOMAHIDI & KOMÁROMI, 2004; FÜLÖP et al., 2012, 2018; PÂRÂU, 2011) observed the preponderance of *B. buteo* in the autumn migration, too. Also, *F. vespertinus*, *F. tinnunculus* and *F. subbuteo* had higher numbers, with a maximum of 12 individuals on September 27, 2019, for *F. vespertinus*, 6 individuals on September 28, 2008, respectively September 27, 2019, for *F. tinnunculus* and with a maximum of 6 individuals on September 13, 2015, for *F. subbuteo*. The other species (*Aquila pomarina*, *Buteo lagopus*, *B. rufinus*, *Circus cyaneus*, *C. macrourus*, *C. pygargus*, and *Circaetus gallicus*) counted only a few individuals. Although the observations were performed mainly in September, certainly *Pernis apivorus* began the passage through the area before August 28, the earliest day of observations, *Falco tinnunculus*, *F. vespertinus* and, also, *Pernis apivorus* continued the migration after September 28, and *Buteo buteo* continued the migration after November 1. *Accipiter nisus* was observed between September 1 and October 19, with the peak to the end of interval, *Aquila pomarina* between September 9 and 28, *B. buteo* between September 9 and November 1, with a massive passage between September 28 and October 19, *Circus aeruginosus* between September 5 and October 19, with the majority of the individuals until September 19, *C. cyaneus* between September 28 and October 19, *C. pygargus* between September 12 and 27, *Circaetus gallicus* between September 5 and 28, *Falco subbuteo* also between September 5 and 28, with a top in the second ten days period of September, *F. tinnunculus* between September 19 and 28, with a concentration at the end of September, *F. vespertinus* between September 13 and 28, more intensely at the end of September, and *Pernis apivorus* between August 28 and September 28, with many individuals at the middle of September. The other species (*Buteo lagopus*, *B. rufinus*, *Circus macrourus*) sporadically appeared with 1 or 2 individuals (Table 2). Comparing the results with ones from Dobruja, we see periods of migratory maximum intensity at the end of September, the beginning of October, for *Buteo buteo*, a little earlier than in our case, at the end of October, for *Pernis apivorus*, almost a month later that in our case, in the second half of September, for *Aquila pomarina*, a little later than in our case, at the last half of September, the start of October, for *Accipiter nisus*, like in our case, and at the end of August, the beginning of September, for *Circus aeruginosus* a little earlier than in our case (FÜLÖP et al., 2018). Other authors (STANCIU et al., 2017) found an intense migration of *B. buteo* (*vulpinus* subspecies) at the end of September and a weaker one (for *buteo* subspecies) at the beginning of October, but we did not take the subspecies into account. Differences of about a month between the peaks of migration were observed from a year to another in some species, for instance *Pernis apivorus* and *Accipiter nisus* (https://monitoring.sor.ro/). The different

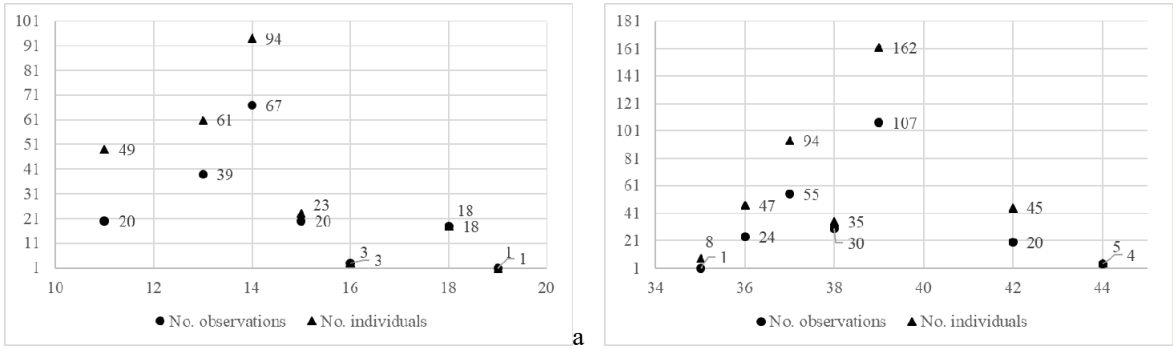
populations, the weather conditions variable between years, and the unequal number of days of observations can explain these differences.

Table 2. The strengths of species of birds depending on the days of observation and their constancy and dominance in the autumn migration.

No.	Species	28.08.2011	5.09.2020	8.09.2018	9.09.2018	12.09.2020	13.09.2009	13.09.2015	18.09.2017	19.09.2010	21.09.2009	27.09.2019	27.09.2020	28.09.2008	28.09.2014	19.10.2014	1.11.2020	Constancy	Index of constancy	Dominance	Index of dominance
1	*Accipiter nisus*				1	2		3	3	7	2	3	8	7	20	15		64.71	C3	17.93	D5
2	*Aquila pomarina*				3										1			11.76	C1	1.01	D1
3	*Buteo buteo*				1				2			1	4	30	16	26	4	47.06	C2	21.21	D5
4	*Buteo lagopus*																1	5.88	C1	0.25	D1
5	*Buteo rufinus*								1									5.88	C1	0.25	D1
6	*Circus aeruginosus*		21	15	4	1	24	14	14		1	1			10	2		64.71	C3	27.02	D5
7	*Circus cyaneus*													2		2		11.76	C1	1.01	D1
8	*Circus macrourus*		2															5.88	C1	0.51	D1
9	*Circus pygargus*					1		1	1			1						23.53	C1	1.01	D1
10	*Circaetus gallicus*		1									1			1			17.65	C1	0.76	D1
11	*Falco subbuteo*		1	1		2	1	6		1				1	1			47.06	C2	3.54	D3
12	*Falco tinnunculus*									1		6	3	6	1			29.41	C2	4.29	D3
13	*Falco vespertinus*						4	3				12		6	4			29.41	C2	7.32	D4
14	*Pernis apivorus*	8	6		1	6	1	15	2			9		2	5			58.82	C3	13.89	D5
All species		8	31	16	10	12	30	42	23	9	3	34	15	54	59	45	5		- period of migration		

Legend: C1 – occasional species, C2 – accessory species, C3 – constant species, C4 – euconstant species, D1 – subrecedent species, D2 – recedent species, D3 – subdominant species, D4 – dominant species, D5 – eudominant species.

If we relate to the weeks of the year, we state that the maximum of the number of observations and the maximum of the number of observed individuals were during the 14th week (April 2-8), mainly due to *Circus aeruginosus* (20 observations, 23 individuals), *Buteo buteo* (12 observations, 26 individuals) and *Aquila pomarina* (9 observations, 17 individuals) in the spring migration, and during the 39th week (September 24-30), mainly due to *B. buteo* (18 observations, 51 individuals), *Falco vespertinus* (15 observations, 22 individuals), *F. tinnunculus* (13 observations, 16 individuals), and *Pernis apivorus* (13 observations, 16 individuals) (Fig. 2). Large concentrations of birds at the end of September were observed in North Dobruja, too (PÂRÂU, 2011).



a b

Figure 2. The weekly variation of the number of observations and of the number of observed individuals during the spring (a) and the autumn (b).

Regarding the constancy, no species was euconstant. In the spring migration, the most were accessory species (6, 50.00% of all) and occasional ones (5 species, 41.66% of all), while, in the autumn migration, the most were occasional species (7, 50.00% of all), followed by accessory ones (4 species, 28.57% of all). The constant species were poorly represented: *Circus aeruginosus*, in spring (8.33% of all), and *Accipiter nisus*, *Circus aeruginosus*, and *Pernis apivorus* in autumn (21.42% of all). In terms of dominance, in spring, the most numerous were the eudominant species (in number of 4, 33.34% of all), followed by the subdominant ones (3 species, 25.00% of all), the recedent ones (2 species, 16.67% of all), the subrecedent ones (2 species, 16.67% of all) and the dominant ones (1 species, *Circus cyaneus*, 8.34% of all); in autumn, the most numerous were the subrecedent species (in number of 7, 50.00% of all), followed by the eudominant ones (3 species, 21.42% of all), the subdominant ones (2 species, 14.29% of all), and the dominant ones (1 species, *Falco vespertinus*, 7.14% of all); the recedent species were absent. *Circus aeruginosus* was constant both in spring and autumn migration and *Accipiter nisus*, *Buteo buteo* and *C. aeruginosus* were eudominant both seasons. Considering the values of the indicators, in the spring migration, *C. aeruginosus* was the most frequent (with 54.17% of the days of observation) and *B. buteo* the best represented as number of individuals (with 35.34% of all) and, in the autumn migration, *A. nisus* and *C. aeruginosus*, with 64.71% of the

days of observations (the constancy), respectively *C. aeruginosus*, with 27.02% of all individuals (the dominance) (Table 1 and 2). Our data from the autumn migration differ from that found in Dobruja, where *Buteo buteo* was the most abundant species, followed by *Aquila pomarina*, *Accipiter nisus* and *Circus aeruginosus* (FÜLÖP et al., 2018). In the Iași area (BALTAG, 2010), *B. buteo* dominated in migration (spring plus autumn), followed by *Falco tinnunculus*, *Accipiter gentilis* (Linnaeus, 1758), *Aquila pomarina*, *Circus cyaneus*, *C. aeruginosus*, *Accipiter nisus* etc.

Not all individuals of migrating species were observed in passage flight. So, 1 individual of *Aquila pomarina* was seen searching for food at 150-250 m height over the pastures from Mateiaș, on April 16, 2012, and 1 female of *Circus pygargus* was also seen searching for food at 5-15 m height over the pastures with bushes from Piatra, on May 3, 2015. Also, some individuals of *Accipiter nisus*, *Buteo buteo*, *Falco subbuteo*, *F. tinnunculus* and *Pernis apivorus*, species that stay in the Mateiaș area in the breeding season, it is possible to have been Nordic and migratory individuals confused with the local ones. Also, we excluded from the calculations all individuals of *Falco peregrinus* Tunstall, 1771 and *Accipiter gentilis*, because they did not show a clear migratory behaviour. Also, 1 immature of *Haliaeetus albicilla*, observed on May 31, 2009, at Mioarele, was not considered in migration, but in wandering, it glided toward West, at 1,000 m height. The low numbers of *Falco subbuteo* and *Pernis apivorus* from the spring migration and of *Aquila pomarina* are surprising; not so much for *Circus cyaneus* from the autumn migration, a species more abundant elsewhere (BALTAG, 2010; PÂRÂU, 2011; FÜLÖP et al., 2012, 2018). The explanation can be related to the possibility of *Falco subbuteo* (STRANDBERG et al., 2009; MEYBURG et al., 2011) and *Circus cyaneus* (RUSSELL, 1991) of migrating during the night. Also, they migrate in broad front and even in relatively low numbers in areas where the migrating birds are in high strengths, i. e., *F. subbuteo*, only 59 individuals a season in mean, and *C. cyaneus* only 21 individuals a season in mean, at Burgas, Bulgary, in the autumn migration (MICHEV et al., 2011). Additionally, at least, *F. subbuteo* can overpass the high Carpathians (MĂTIEȘ, 1986), which means that it is not constrained to go through low places. Maybe some individuals remained unobserved because of the high level of flight or the days of observations did not overlap on the main period of migration for these species. Also, *Pernis apivorus* and *Aquila pomarina* probably use different patterns of migration in spring and in autumn.

The majority of individuals travelled solitary or in small groups over the area. 1 individual/ observation was registered in 71.15% of cases, 2 individuals/observation in 15.89% of cases, 3-5 individuals in 11.25% of cases, 6-10 individuals in 1.22% of cases and 11-20 individuals/observation in only 0.49% of cases (12 individuals of *Circus aeruginosus*, on September 13, 2009, and 11 individuals of *Buteo buteo*, on September 28, 2008). All species were observed flying mainly solitary, but the weight of the total individuals was different from 100% for *C. cyaneus* and *C. pygargus* to 52.17% for *Aquila pomarina*. The latter had the highest percent for the flight in 2 individuals, and *B. buteo* for the other categories (Table 3).

Table 3. The share (%) of the individuals of some species depending on the number of individuals/observation.

% no. of ind./obs.	AN	AP	BB	CA	CC	CP	FS	FT	FV	PA
1 individual	78.48	52.17	47.22	71.43	100.00	100.00	84.62	88.00	68.42	62.86
2 individuals	15.19	26.09	20.83	18.37	0.00	0.00	15.38	12.00	10.53	20.00
3-5 individuals	6.33	21.74	25.00	9.18	0.00	0.00	0.00	0.00	21.05	14.29
6 -10 individuals	0.00	0.00	5.56	0.00	0.00	0.00	0.00	0.00	0.00	2.86
11 -20 individuals	0.00	0.00	1.39	1.02	0.00	0.00	0.00	0.00	0.00	0.00

Legend: AN – *Accipiter nisus*, AP – *Aquila pomarina*, BB – *Buteo buteo*, CA – *Circus aeruginosus*, CC – *Circus cyaneus*, CP – *Circus pygargus*, FS – *Falco subbuteo*, FT – *Falco tinnunculus*, FV – *Falco vespertinus*, PA – *Pernis apivorus*.

Depending on the schedule (Table 4), unlike other authors (DOMAHINDI et al., 2004; PÂRÂU, 2011), we remarked a maximum of activity between 10:00 and 10:59, in spring, and between 13:00 and 13:59, in autumn. A second interval as importance was later, between 12:00 and 12:59, in spring, and between 16:00 and 16:59, in autumn, so that the hour of maximum aerial activity for all period was between 13:00 and 13:59. If we discuss the monthly situation, we see an interesting thing: the two periods of maximum seem to converge to the middle of the day advancing from March to May, though in March there was another peak of activity between 12:00 and 12:59. March was dominated by *Buteo buteo*, *Accipiter nisus* and *Aquila pomarina*, April was dominated by *B. buteo*, *Circus aeruginosus* and *A. pomarina* and May was dominated by *C. aeruginosus* and *C. pygargus*, each with different favourable period of diurnal flight. As we said earlier, in autumn, beside the maximum period of flight between 13:00 and 13:59, another hour of intense activity appeared from 16:00 to 16:59, visible in September, and, as the days become shorter, the flights seem to concentrate to the middle of the day. By comparison, in the Măcin Mountains (September-October, 2002), the main maximum was between 15:00 and 16:00 (DOMAHINDI et al., 2004), while in the same area (September, 2005) and in the Agighiol area (September, 2010) it was between 10 and 11:00 (PÂRÂU, 2011). September was dominated by *Circus aeruginosus*, *Accipiter nisus* and *Buteo buteo* and October by *B. buteo* and *A. nisus*. It should be remembered that not all months have had the same statistical coverage (March – 110 individuals, April – 120 individuals, May – 19 individuals, August – 8 individuals, September – 338 individuals, October – 45 individuals and November 5 individuals).

If we refer to the species that are more important as number of individuals, some remarks can be done. The amplitude of flight varied from species to species: *Accipiter nisus* – 9:15-16:20, *Aquila pomarina* – 9:05-15:50, *Buteo buteo* – 10:00-16:45, *Circus aeruginosus* – 9:10-17:05, *C. cyaneus* – 10:10-16:15, *C. pygargus* – 11:20-14:25, *Falco subbuteo* – 9:45-16:30, *F. tinnunculus* – 8:50-16:15, *F. vespertinus* – 11:20-16:35, *Pernis apivorus* – 10:25-17:25, principally, depending on the capacity of flight of every species, using thermals or not, and the distance from the roosting/feeding place. The hour of

maximum aerial activity was different from species to species and even from spring to autumn for the same species. So, *Accipier nisus* migrated the most intensely from 10:00 to 10:59, in spring, and from 13:00 to 13:59 in autumn, *Aquila pomarina*, from 14:00 to 15:59 in spring and from 13:00 to 13:59 in autumn, *Buteo buteo* from 12:00 to 12:59 in spring and from 16:00 to 16:59 in autumn, etc. Other authors (STANCIU et al., 2017) partially confirmed our results for *B. buteo*, that registered the most intense period of flight over Dobruja between 10:01 and 13:00 both in the spring and in the autumn migration. Some species (*Circus aeruginosus*, *C. cyaneus*, *Falco tinnunculus*, *F. vespertinus*, *Pernis apivorus*) shown a secondary peak, often in the afternoon, after a low activity most likely caused by feeding or inadequate meteorological conditions. Although it is known that the spring migration is faster than the autumn one (PAYEVSKY, 2013), the hour of maximum dynamics can give an idea about the distance covered by most individuals of every species. Thus, in spring, *Accipiter nisus* seems to roost during night mostly on the southern hills from vicinity, while in autumn, it seems to do this on the hills from the northern versants of Carpathians or in Transylvania. Contrary, in spring, it seems that only a few individuals of *Aquila pomarina* spend the night on the hills from vicinity, most of the individuals coming from 5-6 hour of flight, that means at least 50 km distance, namely from the corps of forests of the Romanian Plain, especially the coppice forests of Argeș and Danube (Table 5). We considered 45-50 km a day the average speed of flight (with 20-224 km/day, the limits) for *Accipiter nisus* (PAYEVSKY, 2013) and 107-163 km a day the average speed of flight for *Aquila pomarina* (HEDENSTRÖM, 1997). Also, the most of individuals of *Pernis apivorus*, that cross during the autumn migration ca. 100-250 km per day during 4-7 hours of flight (VANSTEELANT et al., 2015), probably start in the morning from the central areas of Transylvania. Equally, the discussion ca be made for the other species.

Table 4. The share (%) of observed individuals depending on the schedule (Romanian Standard Time).

Schedule	March	April	May	August	September	October	November	Spring (March, April, May)	Autumn (August, September, October, November)	All period
8:00-8:59	0.00	0.83	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.16
9:00-9:59	0.91	5.83	5.26	0.00	6.80	0.00	0.00	3.61	5.81	4.96
10:00-10:59	29.09	15.83	15.79	0.00	9.17	2.22	0.00	21.69	8.08	13.33
11:00-11:59	8.18	17.50	10.53	0.00	17.75	20.00	0.00	12.85	17.42	15.66
12:00-12:59	20.91	11.67	36.84	0.00	19.82	15.56	40.00	17.67	19.19	18.60
13:00-13:59	17.27	8.33	5.26	0.00	21.60	53.33	60.00	12.05	25.25	20.16
14:00-14:59	7.27	24.17	10.53	0.00	6.51	8.89	0.00	15.66	6.57	10.08
15:00-15:59	15.45	11.67	10.53	0.00	6.80	0.00	0.00	13.25	5.81	8.68
16:00-16:59	0.91	4.17	0.00	100.00	11.54	0.00	0.00	2.41	11.87	8.22
17:00-17:59	0.00	0.00	5.26	0.00	0.00	0.00	0.00	0.40	0.00	0.16

Legend: – maximum values.

Table 5. The share (%) of the individuals of the species according to the schedule and season of migration.

Schedule	AN		AP		BB		CA		CC		CP		FS	FT		FV	PA	
	S	A	S	A	S	A	S	A	S	A	S	A	A	S	A	A	S	A
8:00-8:59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.09	0.00	0.00	0.00	0.00
9:00-9:59	2.94	8.45	5.26	0.00	0.00	0.00	6.98	14.95	0.00	0.00	0.00	0.00	7.14	9.09	0.00	0.00	25.00	0.00
10:00-10:59	70.59	7.04	13.16	0.00	14.77	2.38	9.30	13.08	15.38	0.00	0.00	0.00	21.43	9.09	0.00	0.00	25.00	14.55
11:00-11:59	8.82	12.68	10.53	0.00	11.36	16.67	25.58	26.17	15.38	0.00	0.00	25.00	21.43	9.09	11.76	17.24	25.00	9.09
12:00-12:59	5.88	19.72	2.63	25.00	28.41	13.10	11.63	24.30	0.00	25.00	66.67	25.00	21.43	36.36	11.76	13.79	25.00	21.82
13:00-13:59	8.82	35.21	0.00	75.00	19.32	23.81	9.30	15.89	15.38	25.00	16.67	25.00	14.29	0.00	35.29	31.03	0.00	21.82
14:00-14:59	0.00	7.04	34.21	0.00	12.50	8.33	20.93	3.74	23.08	0.00	16.67	25.00	0.00	9.09	5.88	17.24	0.00	5.45
15:00-15:59	2.94	2.82	34.21	0.00	11.36	10.71	9.30	1.87	15.38	50.00	0.00	0.00	7.14	18.18	5.88	0.00	0.00	10.91
16:00-16:59	0.00	7.04	0.00	0.00	2.27	25.00	4.65	0.00	15.38	0.00	0.00	0.00	7.14	0.00	29.41	20.69	0.00	16.36
17:00-17:59	0.00	0.00	0.00	0.00	0.00	0.00	2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Legend: AN – *Accipiter nisus*, AP – *Aquila pomarina*, BB – *Buteo buteo*, CA – *Circus aeruginosus*, CC – *Circus cyaneus*, CP – *Circus pygargus*, FS – *Falco subbuteo*, FT – *Falco tinnunculus*, FV – *Falco vespertinus*, PA – *Pernis apivorus*; S – spring migration, A – autumn migration; – maximum values.

The direction of migration over the Mateiaș area varied from spring to autumn and from species to species, demonstrating the effect of bottleneck caused by the forms of relief, the birds coming in the corridor or leaving it in convergent, respectively divergent directions. In spring, the most of the individuals of all species (55.82%) have had a route of migration towards North, and in autumn, most of them migrated toward South (62.63%). The value of the resultant axis (that depend on the days of observation, too) also showed a more intense migration in autumn (381.18) than in spring (217.67) while, the general deviation from the N-S axis (α) was -0.66° (decimal degrees, toward left) in spring and 4.03° (decimal degrees, toward right) in autumn. Most of individuals of *Accipiter nisus*, *Buteo buteo*, *Circus aeruginosus* and *Falco tinnunculus* moved toward North, respectively toward South, but the angle of the resultant axis (α) registered a substantial deviation to the left (9.85°) in the spring migration for *B. buteo*, a higher deviation to the

right (26.65°, that means beyond of NNW) in the spring migration for *C. aeruginosus*, and an important deviation to the right (10.56°) in the autumn migration for *F. tinnunculus*. North-South directions of flight were observed for *B. buteo* in Dobruja, too, where a significant number of individuals moved to the adjacent directions (STANCIU et al., 2017), some of these birds seeming to have our area on the trail. The majority of the individuals of *Aquila pomarina* moved to NNW in the spring migration, and to SSW, in the autumn migration, but α was -22.5° (meaning to NNW), respectively 11.70°. For *Pernis apivorus*, most individuals migrated to South in the autumn season, but the angle between the resultant axis and the North-South direction was high (8.95°, turned to West). Likewise, most individuals of *Falco subbuteo* flew to South (α = -1.66°, turned to East) in autumn. The values for the other species can be seen below (Table 6). Occasionally, some birds were observed when deviated from the normal direction of flight to avoid the local rains, snowfalls, or, simply, thick sheets of clouds in their way in order to use the thermals or the better conditions of flight from the adjacent areas. MĂTIEȘ (1986) found similar results over Carpathians: movements on NW-SE direction for *Buteo buteo*, N-S for *Falco subbuteo*, NNW-SSE for *Aquila pomarina*, N-S for *Pandion haliaetus*.

Table 6. The general sense of flight of the individuals in the spring (S) and in the autumn (A) migration.

Species	Season	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	R	α (°)
All	S	55.82	9.24	5.22	3.61	1.20	0.40	0.00	0.00	0.40	0.00	0.00	0.00	2.01	0.40	7.63	14.06	217.67	-0.66
	A	0.00	0.00	0.00	0.00	0.00	0.00	1.01	9.85	62.63	23.48	2.53	0.25	0.25	0.00	0.00	0.00	381.18	4.03
AN	S	88.24	8.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.94	0.00	33.48	0.75
	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.86	74.65	14.08	1.41	0.00	0.00	0.00	0.00	0.00	69.43	1.53
AP	S	28.95	2.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.63	28.95	36.84	35.73	-22.5
	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.00	0.00	75.00	0.00	0.00	0.00	0.00	0.00	0.00	3.77	11.70
BB	S	67.05	2.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.68	0.00	4.55	20.45	81.50	-9.85
	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.29	71.43	11.90	2.38	0.00	0.00	0.00	0.00	0.00	81.72	0.45
CA	S	32.56	20.93	23.26	11.63	2.33	2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.65	2.33	36.58	26.65
	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.15	54.21	29.91	2.80	0.00	0.93	0.00	0.00	0.00	102.22	5.83
CC	S	23.08	23.08	7.69	15.38	15.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.38	10.34	28.50
	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	75.00	0.00	25.00	0.00	0.00	0.00	0.00	0.00	3.77	10.79
CP	S	50.00	33.33	0.00	16.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.49	17.89
	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.00	25.00	50.00	0.00	0.00	0.00	0.00	0.00	0.00	3.79	5.79
FS	S	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.0	0.00	1	-45.0
	A	0.00	0.00	0.00	0.00	0.00	0.00	7.14	14.29	64.29	7.14	7.14	0.00	0.00	0.00	0.00	0.00	13.19	-1.66
FT	S	90.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.00	0.00
	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.88	47.06	41.18	5.88	0.00	0.00	0.00	0.00	0.00	16.37	10.56
FV	S	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	A	0.00	0.00	0.00	0.00	0.00	0.00	10.34	0.00	75.86	13.79	0.00	0.00	0.00	0.00	0.00	0.00	27.82	-1.21
PA	S	25.00	50.00	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.84	22.5
	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.82	58.18	38.18	1.82	0.00	0.00	0.00	0.00	0.00	53.68	8.95

Legend: AN – *Accipiter nisus*, AP – *Aquila pomarina*, BB – *Buteo buteo*, CA – *Circus aeruginosus*, CC – *Circus cyaneus*, CP – *Circus pygargus*, FS – *Falco subbuteo*, FT – *Falco tinnunculus*, FV – *Falco vespertinus*, PA – *Pernis apivorus*; S – spring, A – autumn; R – resultant value, α – the angle of the resultant axis (in decimal degrees) with the North-South axis (positive – to right, negative – to left, related to the general sense of moving); – maximum values.

CONCLUSIONS

A relatively low passage of birds of prey was observed over the Mateiaș area, which confirms their migration through the Rucăr-Bran Corridor (Southern Carpathians), although some individuals of *Accipiter nisus*, *Buteo buteo*, *B. lagopus*, *Circus aeruginosus*, *C. pygargus*, *Falco subbuteo* and *Pernis apivorus* were observed using the more direct, on the N-S direction, Tămaș Corridor, an adjacent branch of the first, that starts from Rucăr, surpassing the Tămaș Ridge (1,367 m minimum s.l.a.).

16 species were registered (*Accipiter nisus*, ***Aquila pomarina***, *Buteo buteo*, *B. lagopus*, ***B. rufinus***, ***Circus aeruginosus***, ***C. cyaneus***, ***C. macrourus***, ***C. pygargus***, ***Circaetus gallicus***, *Falco subbuteo*, *F. tinnunculus*, ***F. vespertinus***, ***Milvus migrans***, ***Pandion haliaetus***, ***Pernis apivorus***), 12 in the spring migration and 14 in the autumn migration, and other 3 possibly migratory species: ***Haliaeetus albicilla***, *Accipiter gentilis*, ***Falco peregrinus***, but, certainly, the numbers can be higher if the seasons of migration would be completely covered (the species in bold letters are on the Annex I of the Birds Directive – Directive 2009/147/CE). Because of the limited days of survey, our data represent only a sample and we expect the real figure of individuals that seasonally migrate over the location to easily exceed 250 individuals in the spring migration and 600 exceed 250 individuals in the spring migration and 500 individuals in the autumn migration.

As normally, the intensity of migration was not constant, its peaks being during the April 2-8 week, in the spring migration, and during the September 24-30 week, in the autumn migration, but with high numbers also in the second half of March and at the middle of October. In spring, the periods of maximum were at the end of March, for *Accipiter nisus*, the last

days of March, the first day of April, for *Aquila pomarina*, the middle of March and the beginning of April, for *Buteo buteo*, the first half of April, for *Circus aeruginosus* etc. In autumn, *Accipiter nisus* and *Buteo buteo* had the peaks of migration at the end September and much of October, *Circus aeruginosus* in September, before 19, *Pernis apivorus* at the middle of September, etc. Of course, the dynamics differ to some extent from a season to another.

In the spring migration, *Circus aeruginosus* was the most frequent (with 54.17% of the days of observation) and *Buteo buteo* was the best represented as number of individuals (with 35.34% of them) while, in the autumn migration, *Accipiter nisus* and *C. aeruginosus* were the most frequent (with 64.71% of the days of observations) and *C. aeruginosus* was the most dominant (with 27.02% of all individuals).

Some individuals of species like *Aquila pomarina*, *Circus pygargus*, and very probably *Accipiter nisus*, *Buteo buteo*, *Falco subbuteo*, *F. tinnunculus* and *Pernis apivorus*, species that live in similar habitats, with forests and pastures, remain in the area to rest and feed.

Generally, the birds travelled solitary and then in small groups of under 6 individuals. Most frequently of all species, 2 individuals of *Aquila pomarina* were observed migrating together and they can be pairs. Groups with more than 5 members were observed for *Buteo buteo*, *Circus aeruginosus* and *Pernis apivorus*, but they are less likely to be families.

The maximum aerial activity was between 10:00 and 10:59, in spring, and between 13:00 and 13:59, in autumn. *Accipier nisus* migrated the most intense from 10:00 to 10:59, in spring, and from 13:00 to 13:59 in autumn, *Aquila pomarina*, from 14:00 to 15:59, in spring, and from 13:00 to 13:59 in autumn, *Buteo buteo* from 12:00 to 12:59 in spring and from 16:00 to 16:59 in autumn, *Circus aeruginosus*, from 11:00 to 11:59, both seasons, *Pernis apivorus*, between 12:00 and 13:59, in autumn, etc. Based on these, some supposition about the main places of roosting or feeding can be done and they seem to be the adjacent hills and plains.

The low presence of the *Aquila pomarina* in the autumn migration comparatively with the spring migration is surprising. Maybe our study did not catch the main period of passage for the species or, rather, the individuals used the Dâmbovița River as principal mark of navigation in spring, when passing over the Mateiaș area, and the Olt River in autumn, when passing over the Olt Corridor. Also, an obvious difference was seen for *Pernis apivorus*, when, on the contrary, the spring migration was almost insignificant, lower than the *Pandion haliaetus* one. The latter was absent in the autumn migration, and it seemed to follow the river courses, too.

Generally, the birds migrated on the North-South direction, but there are variances from species to species. The different directions of flight over the area suggest the presence of the effect of bottleneck that concentrates the birds through the low corridor created between mountains. Some birds deviated from the normal route to avoid bad flight conditions.

We hope that the study of the migration of the birds of prey through the Rucăr-Bran Corridor will continue with more rigorous observations, inclusively to clarify in what proportion the Tămaș Corridor is used, and that this paper will encourage the researches in similar areas from Romania. Also, we hope that the published material will contribute to the protection of the places used in passage and of the migratory birds themselves.

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Mestecăneanu Adrian
The Argeş County Museum, Armand Călinescu, 44, 110047,
Piteşti, Argeş, Romania.
E-mail: mestecaneanua@yahoo.com

Mestecăneanu Florin
Dârmăneşti, Argeş, Romania.
E-mail: mestecaneanuf@yahoo.com

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